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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/761,884

01/20/2004

Eric R. Schott

EQLC-P01-005

4233

28120

7590

09/30/2009

ROPES & GRAY LLP

PATENT DOCKETING 39/41

ONE INTERNATIONAL PLACE

BOSTON, MA 02110-2624

EXAMINER

DOAN, DUC T

ART UNIT

PAPER NUMBER

2185

MAIL DATE

DELIVERY MODE

09/30/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/761,884	<b>Applicant(s)</b> SCHOTT, ERIC R.	
	<b>Examiner</b> DUC T. DOAN	<b>Art Unit</b> 2185	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 July 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2,8-12,18-20 and 22-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-2 8-12 and 18-20 and 22-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Status of Claims***

Claims 1-31 have been presented for examination in this application.

Claims 3-7, 13-17 and 21 have been canceled.

Claims 1-2 8-12 and 18-20 and 22-31 remain pending in the application.

Claims 1-2 8-12 and 18-20 and 22-31 are rejected.

Applicant's remarks filed 7/1/2009 have been fully considered but they are mooted in view of new ground(s) of rejection necessitated by the Applicant's amendments to the claims.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 8-10, 22-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dimitri (US Pat. 6839802) in view of Jacobson et al (US Pat. 5392244) and in further view of Kim et al (US Pat. 6718436).

As in claim 1, Dimitri discloses a system for providing differentiated classes of storage, comprising a storage device having a plurality of storage locations and a logical block name space for organizing logical block names of the storage locations (Fig 3, storage device, 20a to 20m, logical block name space with LBA as shown in Fig 1, col. 1 lines 9-42), a performance process configured to determine a level of performance for the plurality of storage locations (Fig 4, logic for determine level of performance for storage locations) and partition the plurality of storage locations into a plurality of regions as determined by their different levels of performance (Fig 4, partition into zones), and a mapping process configured to map the partitioned regions of the storage locations and aggregating the logical block names of the storage locations in the partitioned regions having an identical level of performance to a selected section of the logical block name space (Fig 4, mapping partitioned regions/zones to groups/sections of logical blocks having identical performance level, aggregating logical block names LBAs to RAID stripes/sections, col. 8 lines 31-43).

Dimitri does not expressly disclose the claim's RAID controller configures first RAID level. However, Jacobson discloses a RAID controller (Fig 1 14), for assigning a first RAID level configuration to a first set of aggregated logical block names of the storage locations of the storage device (Fig 1 26 and 28). It would have been obvious to one of ordinary skill in the art at the time of invention to include the storage controller as

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suggested by Jacobson in Dimitri's system thereby data can be stored in different storage locations in according to a performance criteria/protocol and thereby further provide the storage system with high performance, high data availability and in an efficiently manner (col. 1 line 50 to col. 2 line 6).

Dimitri and Jacobson do not expressly disclose the claim's a second RAID level of the same storage device. However, Kim discloses assigning a second RAID level configuration to a second set of aggregated logical block names of the storage device, the first and the second RAID level configurations being different from each other (Fig 2, each disk having several RAID levels); the system thereby providing differentiated classes of storage having two or more differentiated RAID level configurations of the same storage device to one or more clients accessing the system (Fig 2, col. 1, partitioning the same disk with different RAID levels, i.e different classes of storages). It would have been obvious to one of ordinary skill in the art at the time of invention to include partitioning storage device as suggested by Kim in Dimitri's system modified by Jacobson and thereby data in the storage device can be provided efficiently to different users, col. 1 lines 55-65).

As in claim 2, Dimitri further discloses the performance process separates the plurality of storage locations into a plurality of categories as determined by their different levels of performance (Fig 4).

As in claim 8, Dimitri further discloses a process configured to employ the storage to provide a file system service (col. 9 line 62 to col. 10 line 9).

As in claim 9, Dimitri further discloses a process configured to provide a storage volume service (col. 9 line 62 to col. 10 line 9, provide volumes in disks to store computer data/data in files).

As in claim 10, Dimitri further discloses the mapping process creates multiple storage volumes at a selected level of performance (col. 9 line 62 to col. 10 line 9, provide volumes in disks to store computer data for example data in files. Fig 3 and 4, col. 8 lines 31-43 grouping to volumes at a selected level of performance).

As in claim 22, Dimitri further discloses a level of performance includes a data access time, or a reliability of a storage location, or a combination thereof (Fig 3 and 4, zones with different data accessing time, storage locations with RAID providing different level of performance/reliability).

As in claim 23, Dimitri further discloses the storage device is a single storage disk (Fig 1, 2).

As in claims 24 Dimitri further discloses the mapping process performs mapping and aggregating when the storage system is designed (col. 9 lines 62 to col. 10 line 9, storage system is designed to map/store database applications' files to outer zones of disks).

As in claim 25, Dimitri further discloses the mapping process performs mapping and aggregating during operation of the storage device (col. 9 lines 10-15, migrating more frequently accessed files to outer zones of disks).

As in claim 26, Dimitri further discloses a performance measurement system for scanning storage locations of the storage device and determine the level of

performance for the storage (Dimitri's Fig 4, scanning storage locations across the disk surface and measure the performance levels as shown in Fig 4).

As in claim 27, Dimitri further discloses the performance measurement system performs experimental read and write operations and determines the level of performance from experimental data collected in the read and write operations (Dimitri discloses the logic to measure performance levels/ utilization factor based on number of read and write operations to accessing files, collected during a measured time period; Based on the history of the this collected information, files are categorized accordingly, see Dimitri's col. 6 lines 7-10).

Claims 11-12, 18, and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dimitri (US Pat. 6839802), in view of Jacobson et al (US Pat. 5392244), and further in view of The PC Guide (The Pc Guide's Multiple (Nested) RAID levels, 2001, herein Pc Guide).

As in claim 11, Dimitri discloses a performance process for providing differentiated classes of storage, based on determined levels of a plurality of storage locations if a storage device, the process comprising the steps of providing a storage device having a plurality of storage locations and a logical block name space for organizing logical block names of the storage locations (Fig 4),

determining a level of performance of the plurality of storage locations (level of performance for storage locations are determined with values shown in Fig 4), partitioning the plurality of storage locations into a plurality of regions as determined by

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their different levels of performance (Fig 4, partitioning into zones), mapping partitioned regions of the storage locations (Fig 4, zones ready to be used to store data in volumes), and aggregating the logical block names of the storage locations in the partitioned regions having an identical level of performance to a selected section of the logical block name space (Fig 4, mapping partitioned regions/zones to groups/sections of logical blocks having identical performance level, aggregating logical block names LBAs to RAID stripes/sections, col. 8 lines 31-43),

Dimitri does not expressly disclose the claim's aspect of configuring of the first RAID level. However, Jacobson discloses assigning a first RAID level configuration to a first set of aggregated logical block names (Fig 1, controller 14 assign RAID level to data of 26 and 28). It would have been obvious to one of ordinary skill in the art at the time of invention to include the storage controller as suggested by Jacobson in Dimitri's system thereby data can be stored in different storage locations in according to a performance criteria/protocol and thereby further provide the storage system with high performance, high data availability and in an efficiently manner (col. 1 line 50 to col. 2 line 6). Dimitri and Jacobson do not expressly disclose the claim's aspect of the second RAID level configuration. However Pc Guide further discloses assigning a second RAID level configuration to a second set of aggregated logical block names, the first and the second RAID level configurations being different from each other (pages 1-2, two RAID levels to a set of disks). It would have been obvious to one of ordinary skill in the art at the time of invention to include the second RAID level as suggested by PC Guide in Dimitri's system modified by Jacobson and thereby further improve the performance for



data of certain application (page 1); Pc Gide further discloses the storage device thereby providing differential classes of storage having two or more differentiated RAID level configurations to one or more clients accessing the system (page 1, providing different RAID levels configurations for different applications for different performance levels).

As in claim 12, Dimitri further disclose including the step of separates the plurality of storage locations into a plurality of categories as determined by their different levels of performance (Fig 4).

As in claim 18, Dimitri further discloses wherein mapping creates multiple storage volumes at a selected level of performance (col. 9 line 62 to col. 10 line 9, provide volumes in disks to store computer data for example data in files. Fig 3 and 4, col. 8 lines 31-43 grouping to volumes at a selected level of performance).

As in claim 28, Dimitri further discloses wherein a level of performance includes a data access time, or a reliability of a storage location, or a combination thereof (Fig 3 and 4, zones with different data accessing time, storage locations with RAID providing different level of performance/reliability).

As in claim 29, Dimitri further discloses wherein the performance measurement system performs experimental read and write operations and determines the level of performance from experimental data collected in the read and write operations (Dimitri discloses the logic to measure performance levels/ utilization factor based on number of read and write operations to accessing files, collected during a measured time period;

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Based on the history of the this collected information, files are categorized accordingly, see Dimitri's col. 6 lines 7-10).

As in claim 30, Dimitri further discloses wherein mapping and aggregating are performed when the storage system is designed (col. 9 lines 62 to col. 10 line 9, storage system is designed to map/store database applications' files to outer zones of disks)

As in claim 31, Dimitri further discloses wherein mapping and aggregating during operation of the storage system that implements the process (col. 9 lines 10-15, migrating more frequently accessed files to outer zones of disks).

Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dimitri (US Pat. 6839802), in view of Jacobson et al (US Pat. 5392244), and further in view of Kim et al (US Pat. 6718436) and Nguyen et al (US Pat. 6690523).

As in claim 19, Dimitri discloses a system for providing differentiated classes of storage, comprising a storage device having a plurality of storage locations, a logical block name space for organizing logical block names of the storage locations (Fig 3, storage device, 20a to 20m, logical block name space with LBA as shown in Fig 1, col. 1 lines 9-42), and performance parameters of the storage locations that vary across the storage device (different zones across the storage device having different performance parameters),

a partitioning process configured to partition the storage locations into regions (partitions into zones) and aggregate the logical block names of the storage locations in the partitioned regions having an identical level of performance to a selected section of

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the logical block name space (Fig 4, mapping partitioned regions/zones to groups/sections of logical blocks having identical performance level, aggregating logical block names LBAs to RAID stripes/sections, col. 8 lines 31-43);

Dimitri does not expressly disclose the claim's RAID controller configures a RAID level. However, Jacobson discloses a RAID controller (Fig 1 14), for assigning a first RAID level configuration to a first set of aggregated logical block names (Fig 1 26 and 28). It would have been obvious to one of ordinary skill in the art at the time of invention to include the storage controller as suggested by Jacobson in Dimitri's system thereby data can be stored in different storage locations in according to a performance criteria/protocol and thereby further provide the storage system with high performance, high data availability and in an efficiently manner (col. 1 line 50 to col. 2 line 6).

Dimitri and Jacobson do not expressly disclose the claim's a second RAID level of the storage device. However, Kim discloses assigning a second RAID level (Fig 2, each disk having several RAID levels); and thereby further providing two or more differentiated classes of storage on the device to one or more clients accessing the system (Fig 2, col. 1, partitioning the same disk with different RAID levels, i.e different classes of storages). It would have been obvious to one of ordinary skill in the art at the time of invention to include partitioning storage device as suggested by Kim in Dimitri's system modified by Jacobson and thereby data in the storage device can be provided efficiently to different users, col. 1 lines 55-65).

Dimitri, Jacobson and Kim do not expressly discloses the claim's aspect of a performance measurement system. However, Nguyen discloses a performance

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measurement system that scans storage locations of the storage device and determines the level of performance of the storage locations (col. 6 lines 15-40, calibration scan of the entire disk to recalibration each and every zones periodically). It would have been obvious to one of ordinary skill in the art at the time of invention to include calibration method as suggested by Nguyen in Dimitri's system modified by Jacobson and Kim such that the different performances of each zones can dynamically be determined and thereby further optimize the performance of the system (Nguyen's col. 1 lines 22-41).

As in claim 20, Dimitri further discloses a system according to claim 19, wherein the partitioning process selects a fixed set of partitions as a function of a selected configuration of system components (Fig 3 selecting zones as a function of a selected configuration of system's files col. 6 lines 7 to 26).

### ***Response to Arguments***

A) With regards to the remark's at page 7 for the Power of Attorney item, the Power of Attorney filed March 24, 2008 is acknowledged.

B) With regards to the remark's at page 7 for the Claim Objections, Applicant's response dated 5/20/2008 pages 8-10 overcomes the Specification Objections stated in the office action dated 11/16/2008 and therefore the specification objection is withdrawn.

C) Applicant's arguments for the rejection of claims 1-2, 8-12, 18 and 22-31 under 35 U.S.C. 103(a) at the remark's pages 8-11 has been fully considered but they are not persuasive. Examiner respectfully traverses Applicant's arguments for the following reasons:

C1) Applicant main argument point is the recited references do not teach the new amending feature that recites "... that assigning a second RAID level configuration to a second set of aggregated logical block names of the storage device,... thereby providing ..two or more RAID level configurations of the same storage device..".

Applicant argues,

".. The Claims as Amended are not Rendered Obvious by Dimitri in view of Jacobsen and the PC Guide . Applicants' system 20 depicted in Fig. 2 can employ multiple storage devices to support two different classes of storage (in a general sense), but specifically supports two different RAID levels on each storage device. In this particular example, the same storage device is supporting both RAID level 10 with pool A22 and RAID level 50 with pool B24.

Prior to the Applicants' invention, systems such as that shown in Dimitri and Jacobsen and PC Guide would have required different physical devices to support different RAID level... Applicants do note that Dimitri does provide a system that enables differentiated array (see the specification at page 11, lines 5 through 8). For example, one client may utilize a RAID 10 level service, while another client may utilize a RAID 5 level service, both however storing their data on the same set of physical disks (see the specification at page 9, line 22 through page 10 line 2). This is not taught or suggested by Dimitri.

....Jacobsen also only discusses the configuration of groups of disks to provide a certain level of RAID performance. For example, multiple disks 26, 28 are

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providing mirror type functionality and multiple disks 24, 30 and 32 are providing parity level performance. There is no suggesting, teaching, or any inference in Jacobsen that any particular one of the disks can provide two different RAID levels of performance...”

In response, While Dimitri in view of Jacobson may not expressly disclose the new amending feature. However, Kim teaches of partitioning the device to two or more RAID levels, see the rationale of claim 1 rejection above.

Applicant further argues

“..Jacobsen does show a disk array controller that can control a first set of disks (26, 28) provide mirror level redundancy and a second set of disks (24, 30 and 32) that can be used to provide parity level redundancy. But that is it. Jacobsen mentions nothing at all whatsoever concerning logical block names (LBN). The Examiner's conclusions about Jacobsen are erroneous for that reason alone...”

In response, the logical block name can be seen as identifier of data block stored in the storage device (LBA) that is taught by Dimitri in the background section col. 1 lines 5-45. Thus the argument is not persuasive.

C2) Applicant's arguments regarding claims 19-20 are similar to the arguments offered for claim 1 and the same responses apply.

C3) Applicant's arguments regarding claims 11-12, 18-31 are further rejected based on the same reasons as discussed in the previous office action dated 3/12/2009 .

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this office action.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 36 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

When responding to the office action, Applicant is advised to provide the examiner with the paragraph numbers, and/or line numbers and page numbers in the application to assist examiner to locate the appropriate paragraphs.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Duc T. Doan whose telephone number is 571-272-4171. The examiner can normally be reached on M-F 8:00 AM 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sanjiv Shah can be reached on 571-272-4098. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Sanjiv Shah/

Supervisory Patent Examiner, Art Unit 2185